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Formulation and Evaluation of Beet Root Lip Balm

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ABSTRACT

Natural elements make up herbal lip balms, which provide a secure and efficient substitute for cosmetics based on chemicals. Herbs, plant oils, and beeswax are increasingly being included in cosmetic formulations, especially for lip care, as a result of consumers' increased preference for organic products. The creation of a herbal lip balm using beetroot powder, beeswax, coconut oil, vitamin E oil, and petroleum jelly is the main goal of this study. These components offer vital advantages like mending, hydrating, and shielding the lips from the elements. Melting point, pH, organoleptic qualities, spreadability, skin irritation, and stability under various storage circumstances were among the important attributes that were assessed for the formulation. According to the findings, the lip balm has outstanding sensory attributes, including a smooth texture, a pleasing scent, and a pleasing red hue. According to stability testing, the lip balm is appropriate for long-term usage because it keeps its integrity at different temperatures. The solution also shown efficacy in preserving and hydrating the lips without causing irritation, offering a substitute for artificial cosmetics. By using natural, non-toxic components, this composition not only guarantees hydration and nourishment but also encourages sustainable cosmetic practices.

Background
Often referred to as "cosmeceuticals," cosmetics containing active herbal elements are becoming more and more well-liked because of their skin-improving and therapeutic qualities. Because of their ability to preserve skin and maintain moisture, these natural substances can be beneficial in lip balms, which are ubiquitous cosmetic items.

Objective
To create and test a herbal lip balm using natural components, evaluating its medicinal, cosmetic, and functional qualities.

Keywords: Herbal Lip Balm, Natural Ingredients, Beetroot Powder, Beeswax, Coconut Oil, Vitamin E, Petroleum Jelly, Skin Care, Formulation, Stability Testing.

INTRODUCTION

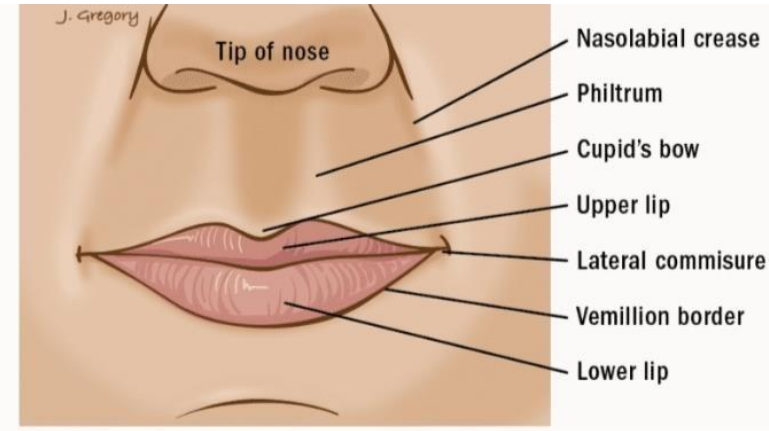
Organic words indicate safety, whereas artificial words are hazardous to human health. Cosmetics containing active chemicals, also known as "cosmeceuticals," are believed to have therapeutic or drug-like advantages[1]. These compounds have therapeutic capabilities that give topical benefits and prevent deteriorating skin conditions. The personal care system has seen a significant surge in the usage of herbal cosmetics. For thousands of years, people all over the world have utilized natural products for traditional medical purposes. Numerous of them possess pharmacological qualities including cytostatic, antimicrobial, and anti-inflammatory actions. Their value in human medicine has been acknowledged.[2]

Formulated with botanical elements like herbs, plant oils, and beeswax, herbal lip balm is a natural substitute for conventional lip balms. It provides the lips with nourishing, hydrating, and calming effects—often without the use of harsh chemicals or artificial smells. Because of their mild yet potent qualities, herbal lip balms are well-liked by people looking for a more all-encompassing approach to lip care.[3]

Ingredients with therapeutic qualities that improve topical action and offer defense against degenerative skin conditions are known as cosmetics.

These substances, which have less adverse effects, were used in this investigation. Lip balms are well-known products that are meant to protect lips instead of adorning them. They create a sticky, water-resistant layer of greasy materials. Typically, no coloring.[4]

Anatomy of lips



The lips are organs that have the capacity to graze, talk, and suction. It is composed of the skin, surrounding muscles, orbicularis muscle, and superficial fascia. The lip margins are covered by a crimson, dry mucous membrane that runs parallel to the skin. The areolar tissue or submucous layer contains the coronary vessels, which completely encircle the buccal orifice near the free border of the lips.[5]

Skin: Like the rest of the body, the lips' outermost layer is made of skin. Conversely, the skin of the lips is thinner and more sensitive.

The vermilion border : It is the obvious line that separates the vermilion-colored area of the lips from the surrounding skin.

Vermilion zone: The vermilion zone is the reddish area of the lips. Because it has more blood vessels than usual, it is crimson in hue.

Philtrum: A philtrum is a vertical depression or groove that extends from the base to the centre of the upper lip.

Cupid's: The double curve or V-shaped region in the centre of the upper lip is known as the cupid's bow.

Oral mucosa: The oral mucosa is a thin, moist layer of tissue that covers the inside of the lips to provide protection. It helps to keep the lips hydrated and is distinct from the outer skin. Lips have tiny glands called labia that help with eating, speaking, and maintaining lip moisture. [26]

Nerve ending: The orbicularis oris, which surrounds the mouth and makes smiling and puckering easier, is one of the numerous muscles that comprise the lips and control their movement and expression. Lips' great density of nerve endings makes them incredibly sensitive to touch, temperature, and pain. [6]

Ideal Characteristics of herbal lip balm

1. It is easy to apply and smooth.
2. It is not poisonous or irritating.
3. It has diverse colors, textures, odors, packaging, and the necessary plasticity.
4. The lip balm has a consistent shelf life and doesn't blossom or sweat when being stored.
5. It must be devoid of impurities.
6. There shouldn't be any grit in it.
7. It need to be durable.
8. It shouldn't solidify or melt within a suitable range of temperature .[25]

Advantages of herbal lip balm

1. All of the natural lipbalms ingredients are safe to use.
2. They also provide natural nutrients that maintain the health of the lips.
3. Their impacts are less or one-dimensional.
4. They are used to treat lip leucoderma and are non-toxic, highly lipophilic, antioxidants, anti-microbials, and anti-inflammatory.
5. A wide variety of colors to select from. Purplish red, ruby red, beetroot purple, dark violet, pastel red, light red, rose red, deep magenta, dark purple, orange, and deep violet are among the original color hues of colorants. 6. These hues can be combined to create a variety of tones. [8]

Application of Lipbalm

Lip balms are products that are used to the lips to shield them from harmful environmental elements and stop them from drying out. There are currently many chemical-based lip balms on the market from brands including Blistex, Himalaya, Nivea, and The Body Shop.[27] Although there is little information on this kind of formulation in the cosmetic literature, references to lipstick are relevant because it is a cosmetic form that is comparable to lip balm. Organoleptic and stability requirements, such as resistance to temperature changes, pleasant taste, innocuousness, smoothness during application, adhesion, and ease of deliberate removal, are also included in this resemblance. Considering that lip gloss is a product meant for both men and women, lip balm should not be compared to it.[4]

INTRODUCTION TO INGREDIENTS

Beet Root Powder

Rich in natural antioxidants and nutrients, the beetroot extracts used in the lip balm provide intense hydration and moisture to your lips, assisting in the restoration of their natural equilibrium and preserving their general health.[28]

Furthermore, a combination of essential oils and vitamin E forms a nourishing and protective layer over the lips, protecting them from drying out, cracking, and environmental harm. These components complement one another to leave your lips feeling smooth, soft, healthy, and refreshed.[9]

Bees Wax

Because of its exceptional natural qualities, beeswax is regarded as one of the most important and valued ingredients in our lip balms. Because of its potent humectant properties, which draw and retain moisture from the air around you, your lips will remain hydrated all day.[29]In addition to retaining moisture, beeswax creates a thin, permeable skin barrier that shields the sensitive lip area from the damaging effects of pollution, wind, and cold. Its inherent emollient properties support healing and relieve any dryness or irritation while maintaining the lips' appearance of firmness, plumpness, and smoothness.**[10]**

Coconut Oil

A popular component for treating and preventing chapped lips, coconut oil is praised for its potent hydrating qualities. Its abundant natural fatty acid composition creates a layer of protection that keeps moisture in while providing deep nourishment and hydration to the sensitive skin on the lips.[30] Lips are particularly vulnerable to moisture loss and environmental damage from elements like wind, sun exposure, and cold weather since their skin is thinner and more

delicate than the skin on other areas of the body. Coconut oil helps keep lips soft, smooth, and healthy by restoring lost hydration and protecting them from harsh environmental factors.[11]

Vitamin E Oil

Vitamin E is essential for preserving and repairing the sensitive skin of the lips, particularly when dryness, low temperatures, or other environmental stressors cause the skin to become painfully damaged. [31]The skin barrier is strengthened and deeply moisturized by this potent antioxidant, which aids in the closure of those little, uncomfortable cracks and promotes the skin's natural healing process. In addition to providing long-lasting moisture, regular use of the award-winning AM/PM Tinted

Lip Balm enhanced with Vitamin E aids in the efficient sealing and healing of these fissures. Your lips stay supple, soft, and noticeably healthier as a result, giving you theopportunityto have comfortable, smooth lips all day.**[**12]

Petroleum jelly

By successfully retaining moisture, this product helps relieve and repair dry, chapped lips, resulting in noticeably healthier and more attractive lips. It is specifically made to shield the sensitive skin of your lips from dryness and environmental harm, using only pure Vaseline Jelly.[32] It provides the long-lasting hydration your lips require to remain supple, smooth, and soft all day. Additionally, it adds a translucent pink tint to your lips, enhancing their natural attractiveness while leaving behind a delicate, pleasant rosy scent that awakens your senses.[14]

Aim:
To formulate a herbal lip balm using natural ingredients, including beetroot extract, for its natural coloring and antioxidant properties.

To evaluate the formulated lip balm for its physicochemical properties, stability, and effectiveness in lip care.

Objectives:

1. To extract and incorporate beetroot pigment (betalains) into a lip balm base as a natural colorant and antioxidant.
2. To select suitable excipients that provide moisturizing and emollient properties.
3. To formulate a stable lip balm using the selected natural ingredients.
4. To evaluate the physicochemical properties of the lip balm including:

- Appearance and texture
- Spreadability
- Melting point
- pH
- Stability
- Wash-off test

To assess the moisturizing effect and potential irritation/sensitivity.[15]

MATERIAL AND EQUIPMENT

Materials

Sr.no	Material
1	Beet root powder
2	Bees wax
3	Coconut oil
4	Vitamin E oil
5	Petroleum jelly

Equipments

Sr.no.	Equipment
1	Beaker
2.	Glass stirring rods
3	Water bath
4.	Spatula or spoon
5	Thermometer
6	Lipbalm molds
7	Dropper
8	Cooling rack or tray
9	Weighing machine

Formulation

Sr.no	Ingredients	Quantity	Uses
1	Beet root powder	1.2gm	Coloring agent
2	Bees wax	1.1gm	Impart glossiness and hardness
3	Coconut oil	0.4ml	Moisturizingagent
4	Vitamin E oil	0.3ml	Anti- oxidant and maintain stability
5	Petroleum jelly	0.5gm	Shield lips from cold and wind

Procedure

1. Setting Up the Water Bath: Put a pan on a fire and fill it about halfway with water. To make a water bath, bring the water to a slow boil. Over the boiling water, place a porcelain dish or a bowl that can withstand heat. As in double boiling, make sure it floats or rests securely above the water's surface.
2. Melting the Beeswax: Fill the china dish with a specified amount of beeswax. On the steam heat, let it melt gradually. To guarantee even melting, stir occasionally with a clean glass rod.
3. Adding Coconut Oil and Petroleum Jelly: After the beeswax has melted fully, mix it with coconut oil. Add petroleum jelly to the mixture right away. Using the glass rod, stir the mixture regularly and gently. Stirring continuously will result in a homogenous, smooth, and consistent mixing of the three ingredients.
4. Adding Vitamin E Oil: Take the ceramic dish off of the stove for a few seconds to allow it to cool somewhat while maintaining its fluidity. To the mixture, add a few drops of vitamin E oil. To guarantee that the vitamin E oil is dispersed evenly, stir thoroughly.
5. Including Beetroot Powder: Add a tiny bit of beetroot powder to the blend. To properly disperse the pigment, give it a good stir.
6. Final Mixing: To ensure homogeneity, stir the entire mixture constantly. Verify that the color is uniform and that there are no lumps of beetroot powder. Depending on how intense you want the lip balm color, change the amount of beetroot powder. 7. Pouring into Containers: Gently transfer the mixture into sanitized lip balm jars or tiny containers while it is still warm and liquid.
7. Setting and Cooling: Let the containers stand at room temperature to cool. For a faster setting time, you can also submerge them in an ice bath. Allow the lip balms to fully set.
8. Finishing: Tightly shut the lids after they have cooled and solidified. You can label them if you like.
9. For your project titled "Formulation and Evaluation of Beetroot Lip Balm," here is a suggested literature survey that you can include in your write-up. This survey reviews existing research and helps establish the significance and context of your study.[16][33]

LITERATURE SURVEY

The use of natural and herbal ingredients in cosmetics has gained increasing attention due to rising awareness about the adverse effects of synthetic chemicals. Herbal lip balms, often formulated with plant-based components such as beeswax, plant oils, vitamin E, and botanical extracts, are widely appreciated for their therapeutic, moisturizing, and protective properties.

According to Kaur and Arora (2015), herbal cosmetics are becoming more popular due to their perceived safety, effectiveness, and fewer side effects compared to synthetic alternatives. These formulations not only provide aesthetic benefits but also aid in healing and protecting sensitive skin areas like the lips.

Beetroot extract, a key component in your formulation, has been highlighted by Chawla et al. (2013) for its natural pigment (betalains) and antioxidant properties, making it suitable as a coloring and healing agent in lip formulations. Beetroot has also shown antimicrobial and anti-inflammatory effects, which further enhance its utility in lip care products.

Beeswax, a well-established emollient, is often used in lip balms due to its ability to form a protective barrier on the skin surface and retain moisture (Gupta et al., 2012). When combined with coconut oil, which is known for its deep hydration and antimicrobial effects (Verma et al., 2018), it enhances the overall efficacy of the formulation.

Sr.no	Evaluation parameter	Observation
1	Melting point	68°c-75°c
2	Organoleptic properties	
	Color	Red
	Odour	Plesant
	Appearance	Excellent and smooth
3	Test of spreadability	Good, no fragmentation, perfect application
4	pH	7.2, neutral in nature
5	Solubility test	Soluble in methanol

Vitamin E oil is widely recognized for its antioxidant and skin-repairing properties. Research by Singh et al. (2016) confirms its role in preventing oxidative stress and enhancing skin barrier function, which is vital in lip care products.

Previous studies have also examined similar formulations. For example, Patel et al. (2020) developed a herbal lip balm using rose extract and observed improved skin hydration and stability over time. These studies support the relevance of your formulation in current cosmetic and therapeutic trends.

EVALUATION

Melting point:- Melting Point of Lip Balm Determination: The capillary tube method was used to ascertain the lip balm's melting point. The product was poured into the capillary, which was then put inside the melting point equipment. It was noted that the substance melted gradually at first, then entirely. The average melting point was noted for each formulation after the process was carried out three times. [21]

Organoleptic properties:- The formulation's physical attributes, such as color, texture, and odor, were closely scrutinized. While the odor was examined for any disagreeable or off-putting scents, the color was reviewed to make sure it was the appropriate tint. To guarantee smoothness, the existence of coarse particles was also examined. The formulation's general

texture and homogeneity were examined to make sure the product was evenly blended and devoid of lumps or irregularities, and its consistency was assessed to see if it had the proper thickness and spreadability.[22]

pH:- To look into the potential for any negative consequences, the pH of lip balm was measured. One gram of the material was dissolved in one hundred milliliters of water to conduct the pH analysis. A pH meter was used to measure the pH. The lip's pH was almost neutral [20]

Skin irritation test:- Itis done by putting lip balm on the skin for ten minutes.

Test of spreadability:- In order to visually evaluate the consistency in the construction of the projective layer and whether the stick broke, distorted, or fragmented after application, the product was applied repeatedly onto a glass slide as part of the spreadability test. Initial results for the prepared lip balm were G-Good: uniform, flawless application, free of fragmentation, and deformed at room temperature. [19]

Stability studies:- The prepared lip balm was incubated for 30 days at normal temperature (25.0+-3.00C), in the refrigerator (4+-2.00C), and in the oven (40.0+2.00C) for advanced stability tests. It was once more examined for organoleptic characteristics, pH, spreadability, and melting point after 30 days. [18]

Effectiveness test on papers:- Ultimately, the lip balm was tested by applying it to a piece of paper after being removed from the chiller. Determining the color from several sources requires this procedure. It can also assess how well the color product works. [17]

CONCLUSION

Natural ingredients like beetroot powder, beeswax, coconut oil, vitamin E oil, and petroleum jelly were used in the manufacture of the herbal lip balm, which has been shown to be safe and effective. The carefully chosen ingredients offer several advantages, such as lip protection, hydration, and nourishment. Excellent organoleptic qualities—such as a smooth texture, a pleasing red color, and a nice odor—were displayed by the product throughout the preparation process. These qualities are critical for customer appeal. The lip balm's melting point, which ranges from 68°C to 75°C, indicates that it is stable and resistant to temperature changes under normal storage settings. This guarantees that even under a variety of environmental circumstances, the lip balm will maintain its efficacy and purity.

The stability studies conducted at various temperatures (room temperature, refrigeration, and oven conditions) confirmed that the lip balm maintained its quality, consistency, and physical properties over time, even after 30 days.

The product was also found to be soluble in methanol, suggesting that it dissolves appropriately for its intended purpose. Furthermore, the lip balm's ability to maintain its properties after exposure to different temperatures and conditions reinforces its suitability as a stable, long-lasting cosmetic product.

In conclusion, the herbal lip balm formulation not only meets the desired aesthetic and functional properties but also provides therapeutic benefits. The combination of natural ingredients offers a safer alternative to commercial lip balms that often contain harsh chemicals. Overall, the lip balm is effective in moisturizing and protecting the lips, is easy to apply, and is safe for prolonged use, making it an ideal product for consumers seeking a natural solution for lip care.

Significance of expected outcomes

There is significant scientific and practical value in the development and testing of a lip balm based on beetroot. The expected results of this study aid in the creation of cosmetic formulas that are safe, efficient, and environmentally friendly. Below is a discussion of the main elements of significance:

1.Marketing of Herbal and Natural Cosmetics Beetroot lip balm's effective formula contributes to the growing demand for natural, herbal, and chemical-free cosmetics worldwide. Rich in betalain colors and antioxidants, beetroot extract is a good natural substitute for artificial coloring and other ingredients frequently found in store-bought lip care products.

2. Biocompatibility and Safety Beetroot extract, beeswax, shea butter, and coconut oil are examples of natural components that are biocompatible and less prone to irritate skin or produce negative responses. In terms of user acceptance, the anticipated result of a safe, non-irritating lip balm is quite important, particularly for sensitive people and pediatric use.

3. Effectiveness of Function It is predicted that the product will offer a variety of benefits, such as mild antioxidant activity, protection against dryness, moisturizing, and a natural lip tint. This increases the formulation's medicinal and aesthetic value, making it more both useful and aesthetically pleasing.

4.Development of the Economy and Sustainability Value addition to natural resources is encouraged by the use of beetroot, an agricultural produce, in cosmetic compositions. Cost-effective production is made possible by the utilization of readily available and reasonably priced raw materials, which makes small-scale and cottage industries possible. This supports women's business and jobs in rural areas.

5.Advantages for the Environment and Health By avoiding petroleum-based components, artificial preservatives, and artificial perfumes, the anticipated natural formulation lessens the risks to the environment and human health that come with traditional cosmetics. The formulation's environmental sustainability is improved by its biodegradability.

6.Room for Additional Investigation and Creativity Future studies into additional herbal colorants and natural excipients may be based on the beetroot lip balm's success. It promotes the blending of ancient knowledge with contemporary pharmaceutical procedures and creates opportunities for creative formulations in the field of herbal cosmetics.

Market Potential and Consumer Awareness A natural lip balm that works well and produces noticeable results can have a big impact on customer behavior and raise awareness of the advantages of herbal goods.

Future Scope of Work

The current study establishes the foundation for the creation of a natural lip balm derived from beetroot that has both potential cosmetic and medicinal uses. There is still a lot of room for more study and advancement, though. To ascertain formulation integrity and long-term shelf life, future research can concentrate on carrying out sophisticated stability experiments in a range of environmental settings. To evaluate the balm's moisturizing effectiveness, user acceptance, and safety profile on a broader scale, in vivo tests on human volunteers will be crucial. By adding SPF qualities, natural sun-protective ingredients like zinc oxide or raspberry seed oil could improve the formulation and increase its multipurposeity. Establishing the product's competitive advantages in terms of efficacy and consumer preference may be aided by comparative research with currently available commercial lip balms. For commercial manufacturing, the formulation must be optimized for better tint retention, consistency, and scalability. Furthermore, the product's functional properties can be expanded by adding more herbal substances like hibiscus, licorice, or turmeric. A complete product line with various flavors, hues, and particular therapeutic advantages can also be created from the fundamental recipe. Finally, to guarantee environmental compatibility and successful market integration, investigating sustainable and biodegradable packaging choices and conducting market feasibility studies would be essential.

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